

§17. New Fast Wave Current Drive System for the JIPP T-IIU Tokamak

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We have developed a new radio frequency (rf) system for the fast wave current drive experiment. The cold test of the antenna section which was conducted on the mock-up of the JIPP T-IIU vacuum vessel was finished¹⁾.

Figure 1 shows a block diagram of the rf system from signal generator to stub tuners. The frequency of the transmitter is 130 MHz. After the intermediate amplifier, the coaxial line is divided into two and phase shifter is installed in one line. We prepared a decoupler to cancel out the unbalance of the input power between the two coaxial lines.

Figure 2 shows the coaxial lines near the antenna section. The solid and dashed lines correspond to the two outputs of the transmitter. This part is so complicated that the thinner coaxial lines are used. After through the DC break, one line is divided into three and each divided line is branched off in two lines. These lines are connected to ceramic feedthroughs and the length of the lines is determined so as to be a same current phase at the feedthrough. Therefore, one final amplifier is connected to six antenna straps and the transmitter feeds 12 straps in all. Figure 3 shows a chart of the straps and the coaxial lines at a port viewing from inside and outside of the vacuum vessel respectively. The every other strap is fed by the same coaxial line but the direction is reversed. With this structure, $(0, \pi)$ phasing is already completed. If only the phase difference between the two main coaxial lines is set up, we can achieve the $(0, \pm\pi/2, \pm\pi, \pm3\pi/2)$ phasing easily.

The antenna is located at an equatorial plane in a low field side. The space between the straps and the width of them are 0.047 m. A photograph of the straps can be seen in a reference 1). The straps are covered with a single layer Faraday shield and protected by carbon limiters.

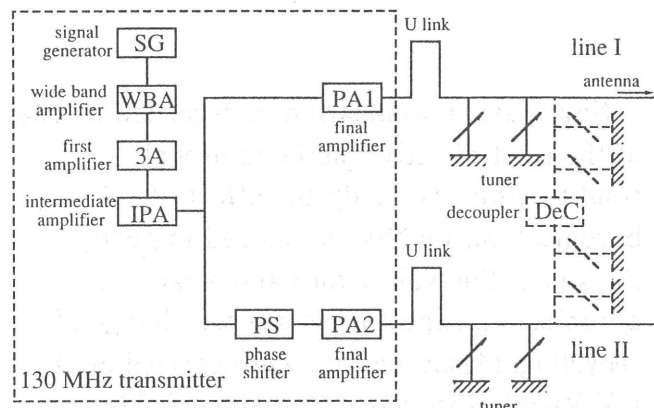


Fig. 1. Block diagram of the rf system.

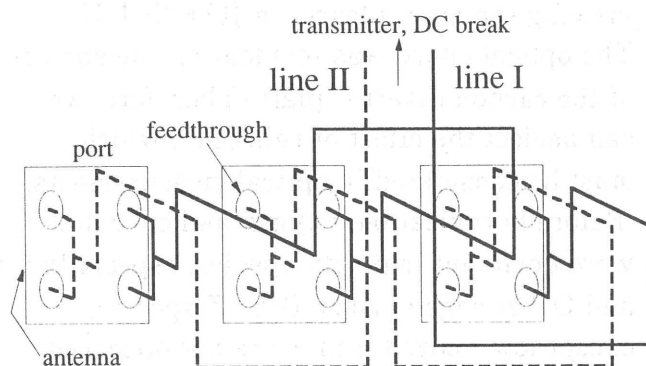


Fig. 2. Structure of coaxial line near the antenna section.

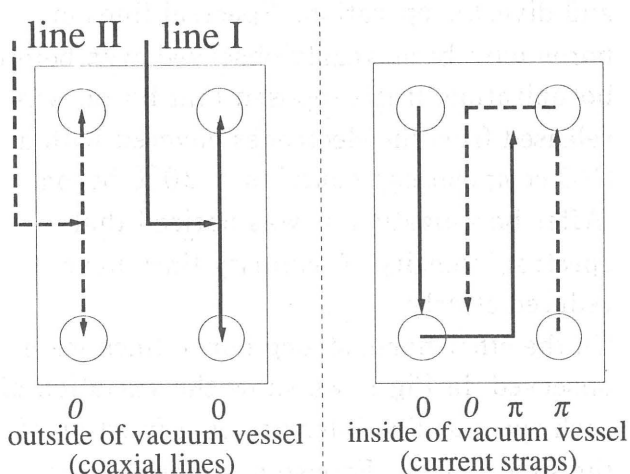


Fig. 3. Chart of the antenna straps (right) and the coaxial lines (left).

References

- 1) Seki, T., et al. : Ann. Rep. NIFS (1993-1994) 166.